Section 15
Control of Hazardous Energy (Lockout/Tagout)

15.1 Scope and Purpose of Lockout/Tagout Program

The unexpected energization, release of stored energy, or startup of machines or equipment can injure employees. This section covers servicing and maintenance of these machines or equipment. It establishes minimum performance requirements to control such hazardous energy at all Reclamation-operated facilities. Contractor work at Reclamation-owned and/or -operated facilities must comply with any existing hazardous energy control procedures of the facility. The section on Electrical Safety contains additional requirements for electrical clearance procedures to control hazardous energy sources.

15.1.1 **Application**. This standard applies to the control of energy when installing, removing, servicing, or maintaining machines and equipment. This standard applies to any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy, but does not apply to the following:

a. Work on cord and plug connected electric equipment in which unplugging the equipment from the energy source controls the exposure to the hazards of unexpected energization or startup of the equipment and the plug is under the exclusive control of the employee servicing or maintaining the equipment.

b. Hot tap operations involving transmission and distribution of substances such as gas, steam, water, or petroleum products when they are performed on pressurized pipelines, provided that the employer demonstrates that (1) continuity of service is essential; (2) shutdown of the system is impractical; and (3) documented procedures are followed and special equipment is used that will effectively protect employees.

15.1.2 **Purpose**. This section requires the establishment of a hazardous energy control program and the use of procedures to affix appropriate lockout devices or tagout devices to energy isolating devices, and to otherwise disable machines or equipment to prevent unexpected energization, startup, or release of stored energy to prevent injury. When required by other sections, use lockout or tagout devices and supplement them with the procedural and training requirements of this section.

15.1.3 **Definitions**

Affected person	An employee whose job requires them to operate or use a system on which servicing or maintenance is being performed under lockout or tagout, or whose job requires

	them to work in an area where such servicing or maintenance is being performed.
Authorized employee	A qualified person who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under this section.
Capable of being locked out	An energy isolating device has a built-in lock, a hasp, or other means for affixing a lock. Other energy isolating devices are capable of being locked out if lockout can be achieved without dismantling, rebuilding, or replacing the energy isolating device or permanently altering its energy control capability (i.e., vendor devices that will make energy isolating device lockable).
Energized	Connection to an energy source or containing residual or stored energy.
Energy isolating device	A mechanical device that physically prevents the transmission or release of energy, including, but not limited to the following: manually operated circuit breakers, disconnect switches, slide gates, line valves, blocks, or similar devices capable of blocking or isolating energy. The term does not include push buttons, selector switches, and other control circuit type devices.
Energy source	Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, nuclear, stored, or other energy.
Hot tap	Work involving welding on a piece of equipment (pipelines, vessels, or tanks) under pressure, to install connections or appurtenances. It is commonly used to replace or add sections of pipeline without interrupting service for air, gas, water, steam, and petrochemical distribution systems.
Job supervisor	Any person authorized to request, receive, and release clearances or Hot Line Orders and who is responsible for meeting the requirements of the Hazardous Energy Control Program.

Lockout	Placing a lockout device on an energy isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.
Lockout device	A device that uses a positive means such as a physical lock, to hold an energy isolating device in the safe position and to prevent the energizing of a machine or equipment. Lockout devices include blank flanges and bolted slip blinds.
Responsible official	The manager responsible for administering the Hazardous Energy Control Program.
Servicing or maintenance	Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining or servicing machines or equipment. These activities include lubricating, cleaning, or unjamming machines or equipment and making adjustments or tool changes where the employee may be exposed to the unexpected energization or startup of equipment, or release of hazardous energy.
Setting up	Work to prepare a machine or equipment for normal production operation.
Tagout	Attaching a tag on an energy isolating device, in accordance with an established procedure, to indicate that employees must not operate the energy isolating device or the equipment until the tagout device is removed.
Tagout device	A prominent visible warning device, such as a tag with a means of attachment, which can be securely fastened to an energy isolating device in accordance with established procedures, to indicate that employees must not operate the energy isolating device until the tagout device is removed.

15.2 **Requirements of the Hazardous Energy Program**

15.2.1 **Program**. Each Reclamation facility and each contractor must have a written Hazardous Energy Control Program that includes written procedures, personnel training, and periodic inspections to ensure that before any employee performs any servicing or maintenance on a machine or equipment in which the unexpected energizing, startup, or

release of stored energy could occur and cause injury or death, the machine or equipment is isolated from all hazardous energy sources.

15.2.2 **Energy Control Procedure**

a. The procedures must clearly and specifically outline the scope, purpose, authorization, rules, and techniques to control hazardous energy and the means to ensure compliance including, but not limited to, the following:

1. A specific statement of the intended use of the procedure.

2. Specific procedural steps for shutting down, isolating, blocking and securing machines or equipment to control hazardous energy.

3. Specific procedural steps for placing, removing, and transferring lockout devices or tagout devices and the responsibility for them.

4. Specific requirements for testing a machine or equipment to determine and verify the effectiveness of lockout devices, tagout devices, and other energy control measures.

b. You do not need to document the procedures for a particular machine or equipment when all of the following elements exist:

1. The machine or equipment has no potential for stored or residual energy or reaccumulation of stored energy after shutdown that could endanger employees.

2. The machine or equipment has a readily identified and isolated, single energy source that will completely deenergize and deactivate the machine or equipment.

3. The machine or equipment is isolated from that energy source and locked out during installation, removal, servicing or maintenance.

4. A single lockout device will achieve a locked-out condition.

5. The lockout device is under the exclusive control of the authorized employee performing the servicing or maintenance.

6. The servicing or maintenance does not create hazards for other employees.

7. No accidents involving the unexpected activation or reenergization of the machine or equipment during servicing or maintenance have occurred.

15.2.3 **Lockout/Tagout**

a. If an energy isolating device is capable of being locked out, the Hazardous Energy Control Program must use lockout procedures, unless the employer can justify an operational need to use a tagout system instead of locking out. The employer must demonstrate that using a tagout system will fully protect employees.

b. If an energy isolating device is not capable of being locked out, the Hazardous Energy Control Program must use a tagout system.

c. Whenever replacing, making major repairs to, renovating, or modifying a machine or equipment, and whenever installing new machines or equipment, the design of energy isolating devices for the machine or equipment must be designed to accept a lockout device.

15.2.4 **Full Personnel Protection**

a. When using a tagout device on an energy isolating device that is capable of being locked out, attach the tagout device at the same place you would have attached the lockout device. The employer must demonstrate that the tagout program will provide the same level of safety as a lockout program. Tagout alone is not considered as protective as lockout; therefore, additional measures must be taken.

b. In demonstrating that the tagout program provides an equivalent level of safety as a lockout program, the employer must demonstrate full compliance with all tagout-related provisions of this section, together with such additional elements needed to provide the same level of safety as a lockout device. Full personnel protection must include implementing additional safety measures, such as removing an isolating circuit element, blocking a controlling switch, opening an extra disconnecting device, or removing a valve handle to reduce the likelihood of inadvertent energization.

15.2.5 **Protective Materials and Hardware**

a. Use locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, or other hardware will be provided to isolate, secure, or block machines or equipment from energy sources.

b. Lockout devices and tagout devices must be singularly identified, must be the only device(s) used to control energy, must not be used for other purposes, and must meet the following requirements:

1. Durable.

(a) Lockout and tagout devices must be capable of withstanding their environment for the maximum expected exposure.

(b) The construction and printing of tagout devices must prevent the tag from deteriorating or the message on the tag from becoming illegible when exposed to weather conditions or wet and damp locations.

(c) Tags must not deteriorate when used in corrosive environments such as areas where acid and alkali chemicals are handled and stored.

2. Standardized. Lockout devices within the facility must be of the same color, shape, and size.

3. Substantial.

(a) Lockout Devices. Lockout devices must be substantial enough to prevent removal without using excessive force or unusual techniques, such as bolt cutters or other metal cutting tools.

(b) Tagout Devices. Tagout devices, including their means of attachment, must be substantial enough to prevent inadvertent or accidental removal. The means to attach tagout devices must be nonreusable type, attachable by hand, self-locking, and nonreleasable with a minimum unlocking strength of at least 50 pounds and at least equivalent in general design and basic characteristics, to a one-piece**,** all environment-tolerant, nylon cable tie.

4. Identifiable. Lockout devices and tagout devices must indicate who applied the device(s).

c. Tagout devices must warn against hazardous conditions if the machine or equipment is energized and must include a legend such as: DO NOT START, DO NOT OPEN, DO NOT CLOSE, DO NOT ENERGIZE, DO NOT OPERATE.

15.2.6 **Energy Isolation**. Only authorized personnel may perform lockout or tagout.

15.2.7 **Notification of Personnel.** The job supervisor or authorized person must notify affected employees after lockout or tagout devices have been placed or removed and before machines or equipment are started.

15.2.8 **Periodic Inspection**. At least annually, conduct inspections to ensure adherence to all requirements of the hazardous energy control program. As a part of the inspection, inspect each energy control procedure used at the facility. The responsible official must

certify that the inspections have been performed. The certification must specify the system on which the energy control procedures were used when inspected, the date of the inspections, and the names of employees and included in the inspections.

a. A qualified individual who does not use the specific hazardous energy control procedure must inspect it annually.

b. Annual inspections of hazardous energy control programs and procedures must include a review between the inspector and employees involved in use of the procedures to assess individual, personal knowledge of, and responsibilities under the program.

c. Document any deficiencies and take appropriate measures to correct the deficiencies and to ensure future compliance.

d. Conduct additional inspections when an incident occurs.

15.2.9 **Training and Communication**

a. Provide annual training to ensure that employees understand the purpose and procedures of the energy control program and that they acquire the knowledge and skills to safely apply, use, and remove the energy controls. All employees involved with hazardous energy control procedures must have initial training and must demonstrate adequate working knowledge of hazardous energy control policies and local programs and procedures before they are placed on the list of authorized personnel. The training must include the following:

1. Each authorized employee must receive training in recognizing applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control.

2. Each affected employee must be instructed in the purpose and use of energy control procedures.

3. All other persons whose work is, or may be, in an area where energy control procedures may be used, must be instructed about the procedure, and about the prohibition relating to attempts to restart or reenergize machines or equipment that are locked out or tagged out.

b. When tagout systems are used, also train employees in the following limitations of tags:

1. Tags are essentially warning devices affixed to energy isolating devices and do not provide the physical restraint on those devices that is provided by a lock.

2. A tag attached to an energy isolating device must not be removed without authorization of the employee responsible for it, and it must never be bypassed, ignored, or otherwise defeated.

3. Tags must be legible and understandable by all authorized employees, affected employees, and all other employees whose work operations are in, or may be in, the area.

4. Tags and their means of attachment must be made of materials that will withstand the environmental conditions encountered in the workplace.

5. Tags may evoke a false sense of security; understanding hazards, verification, and absolute vigilance must be understood as part of the overall energy control program.

6. Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use.

c. Provide retraining:

1. For all authorized and affected employees whenever job assignments change, systems or processes that present a new energy control hazard change, or when energy control procedures change.

2. Whenever any inspection reveals, or there is reason to suspect, deviations from or inadequacies in the employee's knowledge or use of the energy control procedures.

3. At least annually.

d. The responsible official must certify and document all training and retraining. Certification must contain such information as the name of the employee, the time, date, and location of training, and the name of the trainer.

15.3 **Application of Energy Control.** The established procedures or applying energy control (the lockout or tagout procedures) must cover the following elements and actions and must be done in the following sequence:

15.3.1 **Preparation for Shutdown**. Before an authorized person or affected employee turns off a system (machine or equipment), the authorized person must have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means to control the energy.

15.3.2 **System (Machine or Equipment) Shutdown**. Turn off or shut down the machine or equipment, using the procedures established for the machine or equipment. Use an orderly shutdown to avoid any additional or increased hazard(s) to employees resulting from equipment stoppage.

15.3.3 **System (Machine or Equipment) Isolation**. Physically locate and operate each energy isolating device needed to control the energy to the machine or equipment to isolate it from the energy source(s).

15.3.4 **Lockout or Tagout Device Application**

a. Allow only authorized persons to affix lockout or tagout devices to each energy isolating device.

b. Affix lockout devices, where used, to hold the energy isolating devices in a "safe" or "off" position.

c. Affix tagout devices, where used, to clearly indicate that operating or moving energy isolating devices from the "safe" or "off" position is prohibited.

1. Systems with energy isolating devices that are capable of being locked out must use locking devices. If you cannot affix locking devices, affix tagout devices at the same point of attachment as a locking device.

2. If you cannot affix a tag directly to the energy isolating device, locate the tag as close as safely possible to the device, in a position that will be immediately obvious to anyone attempting to operate the device.

15.3.5 **Stored Energy.** Energy storage devices or equipment capable of storing energy may include, but are not limited to, capacitors; power electronic equipment; pneumatic, such as plant service compressed air and governor pressurized oil systems; and mechanical, such as raised gates and charged springs.

a. After affixing lockout or tagout devices to energy isolating devices, relieve, disconnect, restrain, or otherwise make safe all potentially hazardous stored or residual energy.

b. If stored energy can reaccumulate to a hazardous level, continue to verify isolation until the employee completes servicing or maintenance, or until the possibility of such accumulation no longer exists.

15.3.6 **Verification of Isolation**. Before starting work on locked out or tagged out machines or equipment, the authorized person must verify completion of machine or equipment isolation and deenergization.

15.4 Release From Lockout or Tagout

Before removing lockout or tagout devices and restoring energy to the machine or equipment. Authorized employees must follow procedures and take actions to ensure the following:

15.4.1 **The Machine or Equipment**. Inspect the work area to ensure that nonessential items have been removed and to ensure that machine or equipment components are operationally intact.

15.4.2 **Personnel**

a. Check the work area to ensure that all employees have been safely positioned or removed.

b. Before removing lockout or tagout devices and before energizing machines or equipment, notify affected employees.

c. After removing lockout or tagout devices and before energizing machines or equipment, notify affected employees.

15.4.3 **Lockout or Tagout Device Removal**. The employee who affixed each lockout or tagout device must remove it from each energy isolating device. The responsible official may grant an exception when that employee is not available to remove it. Then, the responsible official may remove the device, provided that specific procedures and training for such removal have been developed, documented, and incorporated into the employer's energy control program. The responsible official must demonstrate that the specific procedure includes at least the following elements:

a. Verification by the responsible official that the authorized employee who applied the device is not at the facility.

b. Making all reasonable efforts to inform the authorized employee that his/her lockout or tagout device has been removed.

c. Ensuring that the authorized employee has this knowledge before he/she resumes work at the facility.

15.5 **Requirements of Operating Equipment Under Clearance**

15.5.1 **Testing or Positioning of Machines, Equipment or Components**. If you must temporarily remove lockout or tagout devices from the energy isolating device and energize the machine or equipment to test or position the machine, equipment, or component, follow the following sequence of actions:

a. Clear the machine or equipment of tools and materials, referring to the subsection on release from lockout or tagout.

b. Remove personnel from the machine or equipment area, using the subsection on personnel. Be thoroughly familiar with the requirements of this section "Control of Hazardous Energy."

c. Remove the lockout or tagout devices referring to the subsection on lockout or tagout device removal.

d. Energize and proceed with testing or positioning.

e. Deenergize all systems and reapply energy control measures using procedures in this section to continue the servicing or maintenance.

15.5.2 **Group Lockout or Tagout**

a. When a crew, craft, department, or other group of employees performs servicing or maintenance, they must use a procedure that provides the same level of protection as a personal lockout or tagout device.

b. Use group lockout or tagout devices in accordance with the procedures required by this section and FIST Volume 1-1 including, but not necessarily limited to, the following specific requirements:

1. The primary authorized employee has the primary responsibility for the employees working under the protection of a group lockout or tagout device, and for the device itself. The primary authorized employee must determine the exposure status of individual group members with regard to the lockout or tagout of the system.

2. When using group lockout, each authorized employee must affix a personal lockout device to a group lockbox, or comparable mechanism before beginning work and must remove these devices when finished with their portion of the work.

3. When more than one crew, craft, or department, is involved, the written procedure must prescribe the assignment of overall job-associated lockout or tagout control responsibility.

15.5.3 **Shift or Crew Changes**. Use specific procedures during shift or crew changes to ensure the continuity of group lockout or tagout protection. The program must describe a procedure to allow for information exchange to ensure the continuity of protection between off going and oncoming personnel. The primary authorized employee accepting the transfer must physically verify the lockout points.

15.6 **Requirements for Outside Personnel (Contractors, etc.)**

a. Whenever a contractor or non-agency organization is involved in construction, maintenance, or testing on or near equipment in a Reclamation facility or transmission line, a special work permit is required to authorize the contractor to proceed with the work.

b. Properly qualified and authorized Reclamation representatives must request the clearances or hot line orders, perform the required switching, receive the clearances or hot line orders, and issue the special work permit.

c. Contractor personnel performing work at Reclamation-operated or maintained facilities must comply with all existing Hazardous Energy Control procedures of the facility and Reclamation's Hazardous Energy Control Program.